Microsoft

Operating System

Benefits for Mobile Computer Users

Abstract

This paper outlines the specific improvements the Microsoft® Windows® 2000 Professional operating system brings to mobile computing for business users. With new and extended features, Windows 2000 Professional addresses the unique requirements mobile users have for a laptop operating system and a consistent, fluid work experience while traveling at client sites and back in the office.

This document is based on features in the Beta 3 version of Windows 2000 Professional (April 1999). Readers should be aware that features in the final released version of Windows 2000 Professional might vary.

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INTRODUCTION

This paper outlines the specific improvements Windows 2000 Professional brings to mobile computing for business users.[1] One of its major design goals is to create a consistent working environment for mobile computer users whether they are connected or disconnected from the network, enabling them to work more productively. The following improvements help achieve this goal:

- Work in one environment whether connected or disconnected from a network.
- Work offline longer and more efficiently
- Get connected more easily.
- Provide extra security.

[1] Unless noted, the capabilities described in this document do not require any special hardware and work in almost any networking environment. In addition, enhancements made by combining Windows 2000 Professional and Windows 2000 Server are described in the document.

TAKING RESOURCES OFFLINE

Windows 2000 Professional provides mobiles users the same work environment whether on or offline. As a result, users can work in the same files, folders, or Web sites whether they are connected or disconnected and easily synchronize those resources. Consistent access to network-based resources helps users stay more productive whether on an airplane or working at a remote site.

Accessing Files and Folders When Offline

The Offline Files and Folders feature lets mobile users easily take any combination of files, folders, or entire *mapped* drives offline. Instead of using a separate tool, such as the Briefcase, users simply right-click any network-based file or folder and click **Make Available Offline** on the menu.[2]

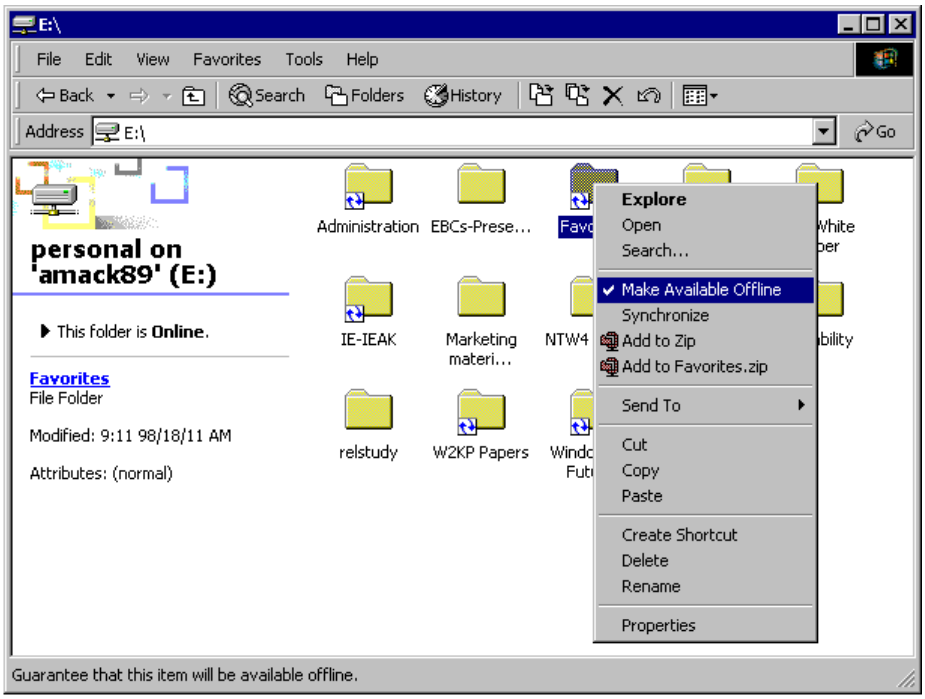

Figure 1. Windows 2000 Professional users right-click on the files and folders they would like available when working offline. Folders available for offline use are visually highlighted using double arrows.

When the computer is offline, the files and folders appear in the same directory as they did online—as if they still resided in the same location on the network. This makes them easy to find. Plus, files and folders are visually tagged for offline use by the *roundtrip arrows* in their bottom left corner.

[2] The offline files and folders feature works with any Server Message Block (SMB)-based file server, including Windows for Workgroups and any version of Windows NT Server. Administrators can also use third-party SMB utilities to make the feature available on non-Microsoft platforms such as Novell NetWare and UNIX.

Additional improvements for taking resources offline are available when Windows 2000 Professional is used together with Windows 2000 Server. With Windows 2000 Server, administrators can set properties on shared network folders to define how those files can be stored on client computers. For example, administrators can set a policy that a document cannot be taken offline for security reasons.

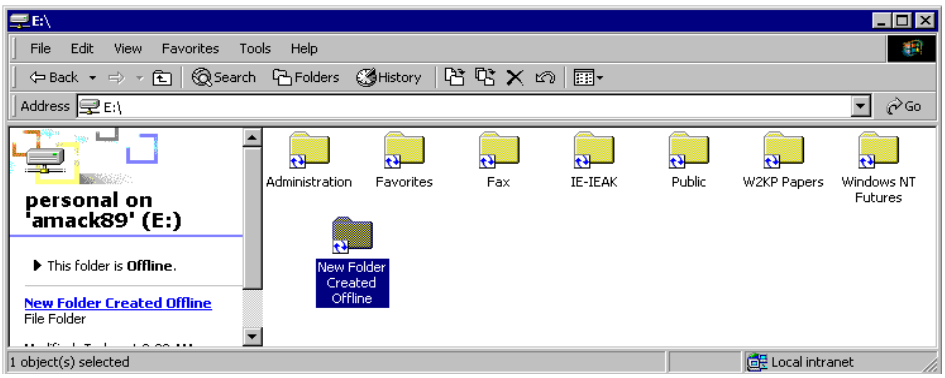

Figure 2. When offline, Windows 2000 Professional users can access network folders and files as if they were working online. The folders above were selected for offline use by the user. Changes made while offline are automatically synchronized after going back online.

Accessing Web Content Offline

Windows 2000 Professional users can also take Web pages or entire Web sites offline for viewing in the same way they take files or folders offline users simply right-click the Web site in one of the Explorer bars. A wizard guides users through taking a Web page and its related links offline, and users can schedule when updates to the Web page content should be made.

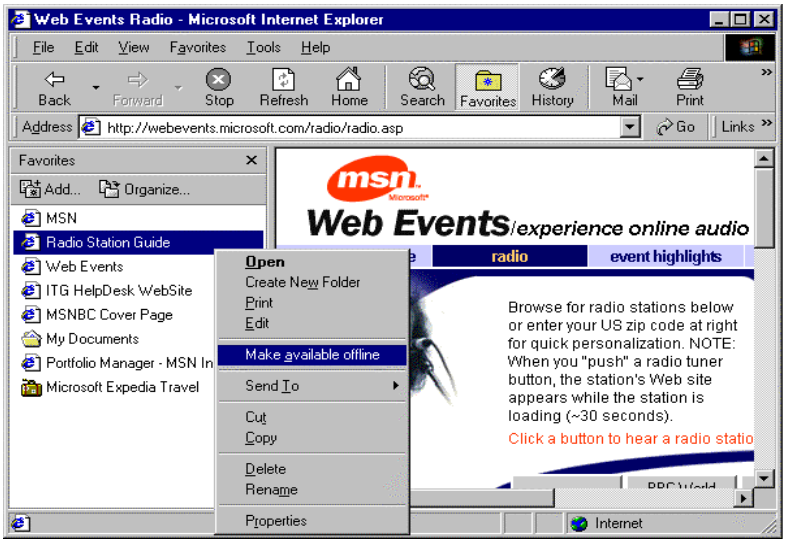

Figure 3. Users can take Web pages and links offline in the same way as they take files and folders offline.

ONE-STOP SYNCHRONIZATION

When working with any resources offline, it's critical for users to update the online versions when they reconnect to the network or update the local versions when they go back offline. Today, users must separately synchronize resources, such as e-mail, calendars, Web pages and databases.[3] Windows 2000 Professional provides a single tool for synchronizing all network resources, saving users time.

Synchronization Manager

The new Synchronization Manager tool in Windows 2000 Professional users can synchronize all network resources, including files, folders, e-mail, and databases, in a single location. Users can set the Synchronization Manager to automatically synchronize some or all of their resources. For example, users can set certain files and folders to be synchronized every time they log on or off the network. The Synchronization Manager quickly scans the system for any changes, and if it detects changes, the resources are automatically updated. Only resources that have changed are updated—vastly speeding up the synchronization process.

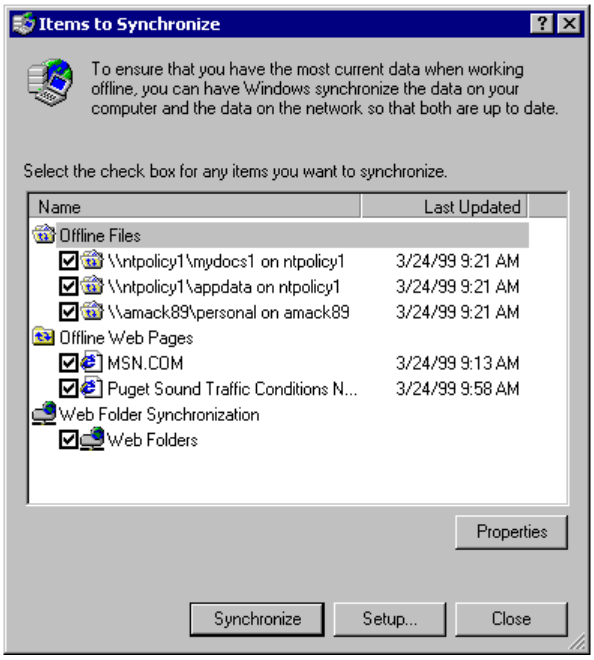

Figure 4. Synchronization Manager provides users with a "one stop" location for synchronizing offline resources.

[3] Applications can be written to take advantage of Synchronization Manager. The Synchronization Manager application programming interface (API) is a public specification, available as part of the Microsoft Software Developers Network (MSDN).

Users can also determine whether files are synchronized when the system is idle, or schedule synchronization for specific time increments, such as every evening. As a result, mobile users always have the most up-to-date information, such as pricing, inventory, or sales data, to communicate to partners and clients—even when traveling.

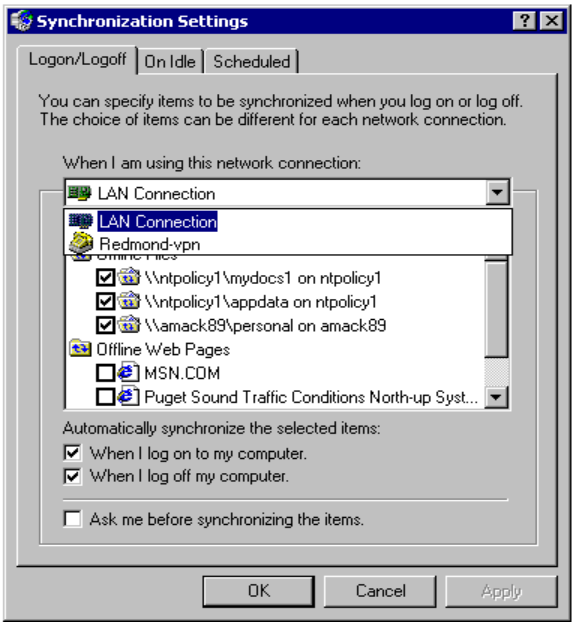

Figure 5. Users can set preferences for when resources are synchronized, such as on logon and logoff, idle or at scheduled times.

Synchronization Manager users can also synchronize resources based on their connection types. For example, a user can save time by specifying that large database files only be synchronized when the computer is using a high-speed connection and that all personal documents stored in a specific file are synchronized every time they are connected to the corporate LAN.

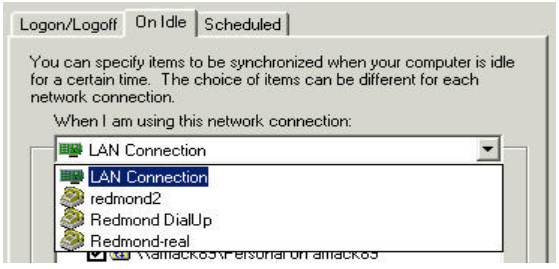

Figure 6. Based on user preferences, network resources are automatically synchronized.

Although Synchronization Manager is designed primarily to synchronize documents, it also includes the ability to resolve version conflicts in the event that multiple people edit the same document.

STAYING ON THE GO

Business travelers broadly use mobile computers so they can remain productive in and out of the office. Windows 2000 Professional helps people make maximum use of their time on the road by delivering better offline performance and battery conservation.

Managing Portable PC Power

Maximizing battery life is a constant challenge for mobile users. Windows 2000 Professional supports the latest generation of power management technology called the Advanced Configuration and Power Interface (ACPI) hardware. ACPI defines a flexible and extensible hardware power management interface. With ACPI Windows 2000 Professional is able to manage a system's power state in response to input from the user, applications, and device drivers.

A user such as a field sales representative making customer calls and using a mobile PC for taking occasional notes or referring to product specifications could configure the system to turn off the display and hard disk after two minutes of inactivity. And the system can be configured to standby after five minutes, allowing the user to make it through an entire day of customer calls. Performance in this case would be slow, but the user can make the decision as to whether power conservation or performance is more important.

An application could notify the operating system that it is performing a long calculation or showing a movie, and the PC should not transition to a low power state. Or the operating system could notify an application that the system is on battery power to avoid background operations such as compressing mail files that can drain a battery quickly.

The device interface allows a system to respond to events initiated at the device. For example, a mobile PC has a modem connected to a wireless phone. Even while on a train the computer could be put into *wait for fax* mode, where only the modem is on, using little power. The phone rings, the modem turns on the computer, answers the phone and downloads the fax. Then the computer shuts off again, using only the minimal amount of power needed.

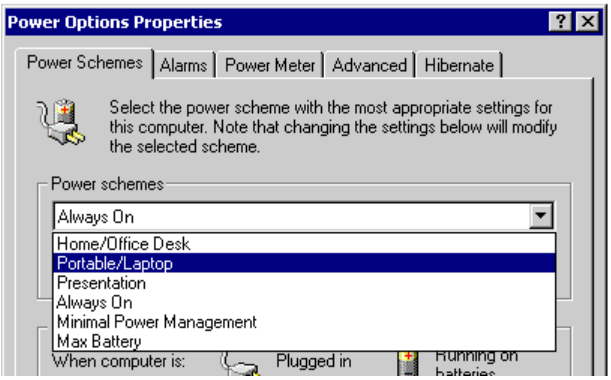

Figure 7. Windows 2000 Professional supports a variety of power management options, aimed at providing users with the ability to choose a balance between battery life and performance that best meets their needs.

Connecting and Managing Peripheral Devices

Users working offline can quickly and confidently add peripheral devices to their computers. Windows 2000 Professional automatically detects and installs most new and many older hardware devices for true Plug and Play performance. Plug and Play also saves time when attaching devices such as projectors and large monitors to laptops during a presentation.

Windows 2000 Professional support for ACPI also allows the Plug and Play manager to work more reliably than previous Plug and Play systems because. It first identifies a new device and then assigns it system resources as necessary. The Plug and Play manager also automatically reconfigures resource assignments when it detects changes to the system.

Windows 2000 Professional supports the Universal Serial Bus (USB) standard, which users can use to plug USB devices into their computers without rebooting. USB devices use a standard connection cable, which means there's no need to travel with extra cables and connectors. Plus, most USB peripherals receive their power from the computer, eliminating the need for additional power cords and electrical outlets.

Docking and Undocking

Windows 2000 Professional users can plug mobile computers in and out of a docking station without rebooting. This is especially helpful because when moving from one environment, such as an office, into a conference room for a presentation open applications and documents continue to run.[4]) If users dock the computer into an unknown configuration, new hardware is detected and installed.

Hardware Profiles

Windows NT Workstation 4.0 required users to manually configure profiles and then select them after starting the computer. Windows 2000 Professional users can move easily between different hardware environments without having to reconfigure hardware or to decipher error messages about devices that are not required for a given profile.

[4] Applications and hardware must support hot docking.

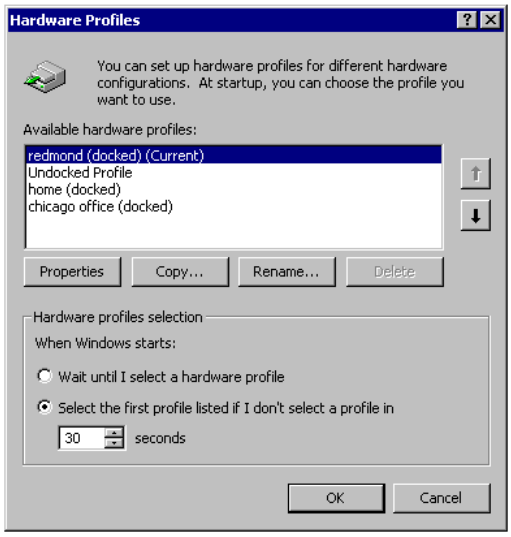

Figure 8. Windows 2000 Professional users can move between configurations for different environments.

OnNow: Quick Startup and Shutdown

A typical computer may take several minutes to completely start—far too long for a business meeting where potential clients are short on time and patience.

Windows 2000 Professional moves the computer closer to turning on at the flip of a switch. Support for the ACPI hardware standard allows a user to move from **Hibernate** mode to on in less than 30 seconds. **Hibernate** mode turns off all power to the computer for an indefinite time, while maintaining the state of open programs and connected hardware when the computer went into hibernation.

For super fast access, Windows 2000 Professional supports **Suspend** mode, which puts the system into a deep sleep, with some power. Waking from **Suspend** mode takes only a few seconds yet can add hours to a battery's life.

Figure 9. Windows 2000 Professional supports Hibernate and Suspend modes which eliminates the need for users to go through a full system reboot

Internet Printing

Mobile users often make hotel rooms their centers of business operations while traveling. With the new Internet Printing feature in Windows 2000 Professional, they can send documents to the hotel business center's printer over the Internet, eliminating the need to leave their rooms and deal with downloading printer drivers or connecting printer cables..[5]

To access a printer over the Internet, users simply type in the path to the printer. Drivers are automatically installed over the Internet and the user can then print the document.

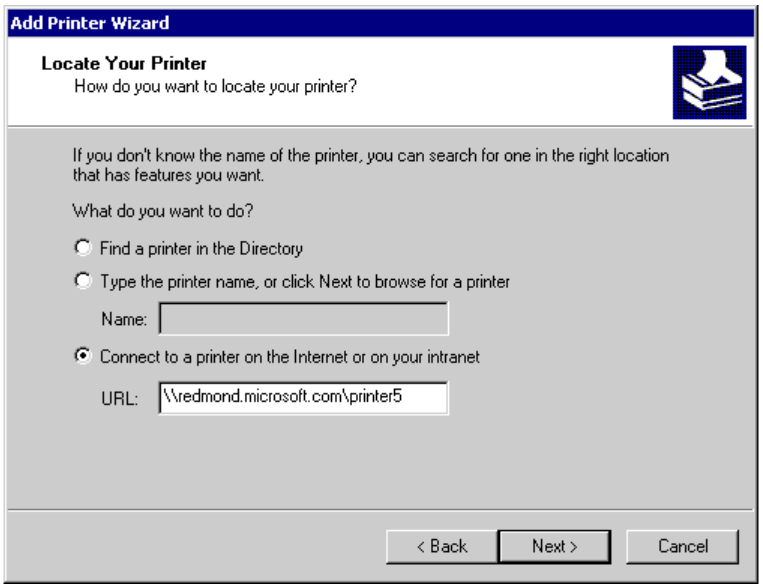

Figure 10. Windows 2000 Professional users can access printers that are available on the Internet.

This feature also automatically creates HTML-based views of the printer and job information so users can check the print-queue status with their Web browser.

[5] Requires the printer be published to the Internet using Windows 2000 Server.

Creating Remote Connections

Windows 2000 Professional makes it significantly easier for users to remotely connect to networks, including to Virtual Private Networks (VPNs), over dialup, infrared, and direct cable connections. A wizard guides users through setting up connections to different types of networks, eliminating the need to manually configure settings.

The Network Connection Wizard helps users create many types of new connections with a single tool. Connection setup is also automated, eliminating the need to download and install additional services—a necessary step in Windows 95 for setting up certain types of remote networking. Other remote connection options include:

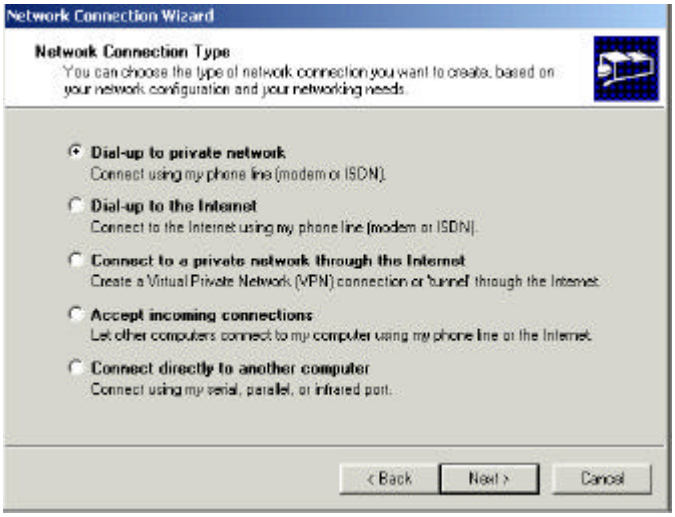

Figure 11. Windows 2000 Professional users can manage their network connections from one location.

- **Dialup to private network**. Dialing up to a private network over a telephone line includes the improved ability to set dialing properties, such as when to use calling cards, PINs, and other connection-specific information.
- **Dialup to the Internet**. Dialing into the Internet includes the improved ability to set proxy settings and other Internet-specific information.
- **Connect to private virtual networks through the Internet**. Connecting to a virtual private network (VPN) is easy through the use of a wizard and automatic configuration of all VPN components, eliminating the need to reboot.
- **Accept incoming calls**. Accepting connections through modem, IrDA, or direct cable connection is improved through the ability of users to set access permissions.
- **Connect directly to another computer**. Connecting computers is improved with a wizard that guides users through the process making a direct cable connection.

Virtual Private Networking

Virtual Private Networks (VPNs) allow users to rely on the Internet as a secure pipeline to their corporate Local Area Network (LAN). Users who are travelling can dial into almost any local Internet Service Provider (ISP), then set up a VPN session to connect to their LAN over the Internet. With VPNs, companies can significantly reduce long-distance dial-up charges, and mobile employees have an inexpensive method of remaining connected to LANs for extended periods.

Configuring Windows 2000 Profession to connect to a VPN is significantly easier with the new Network Connections Wizard. Users enter the VPN server name and Windows 2000 Professional automatically configures the device and adds the appropriate networking services—everything a user needs to get connected in about one minute.

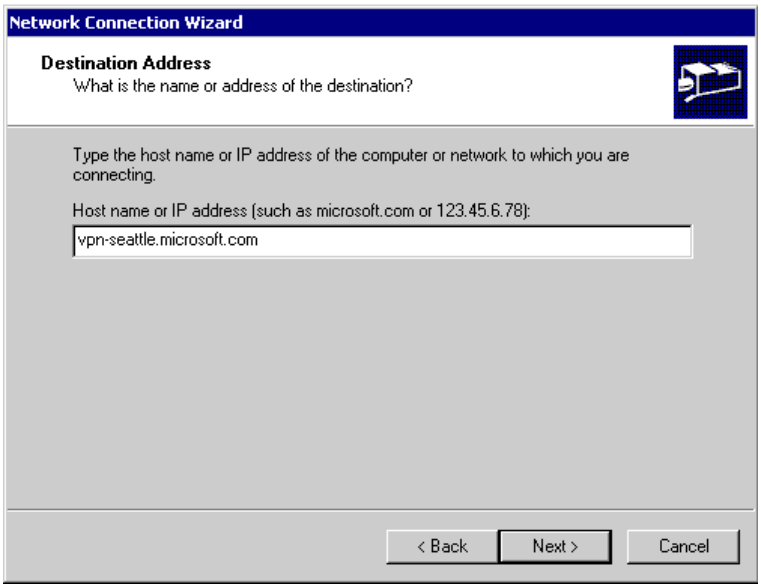

Figure 12. Windows 2000 Professional users simply enter the name of the VPN server.

In addition to supporting today's most common VPN protocol, Point-to-Point Tunneling Protocol (PPTP) Windows 2000 Professional supports new, more secure ways of creating virtual connections such as Layer-2 Tunneling Protocol (L2TP) and IP Security (IPSec), allowing users to connect to corporate networks with confidence.[6]

[6] More information PPTP, L2TP and IPSec can be found in the Windows 2000 Professional Technical Overview, available on www.microsoft.com/windows.

Wireless Connections

Windows 2000 Professional supports the Infrared Data Association (IrDA) protocol suite that lets users transfer information and share resources, such as printers, between computers with no physical cables. Most newer portable computers include hardware support for IrDA.

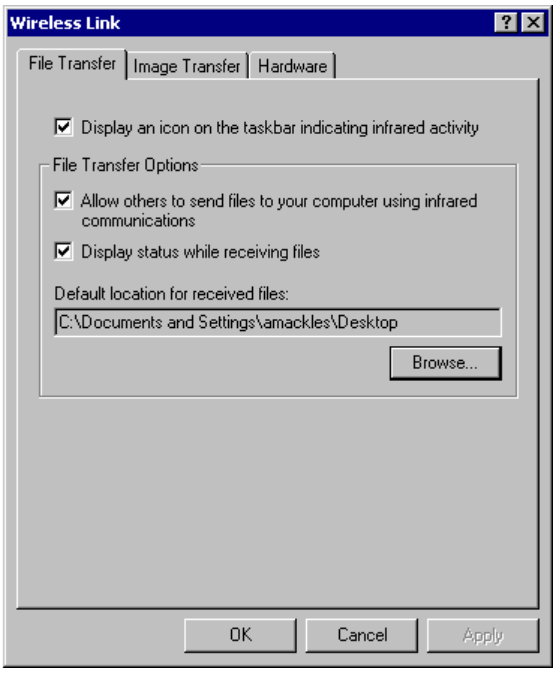

Figure 13. Windows 2000 Professional provides native support for infrared-based communications.

Two users traveling with laptop computers can transfer files by setting up an IrDA connection, instead of using cables or floppy disks. IrDA automatically configures the connection simply by placing the portable computers within close proximity.

IrDA also allows a computer to access resources that are attached to another computer. For example, if a user with a laptop computer needs to print a document, he could create an IrDA connection with a computer that is connected to a printer—either locally or on a network. When that connection is established, and with appropriate permission, the user could print over the IrDA connection.

Windows 2000 Professional also supports the ability to allow or limit users other than the computer's owner to send files using infrared. Users can also specify the location where documents should be received. Windows 2000 Professional automatically detects devices that use infrared communications, such as other computers and cameras.

Using the Same Device for Multiple Connections

Mobile users often need to connect to many different networks while traveling, such as different client networks, a corporate LAN and an ISP. With Windows 95 and Windows NT Workstation 4.0, users must reconfigure their modems each time they connect to a different network. For example, a corporation's proxy server might require a different modem configuration than the user's ISP.

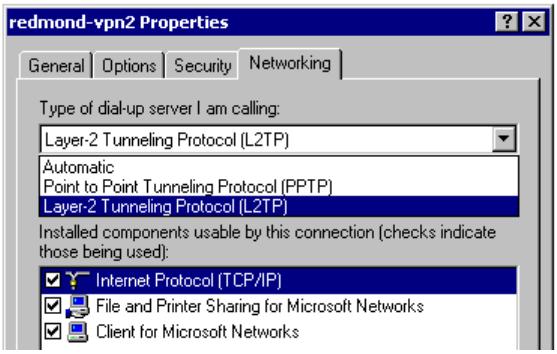

Figure 14. Windows 2000 Professional users can have different configurations for the same communications device.

The Per-Connection Settings feature in Windows 2000 Professional retains individual settings for each network connection so users can connect to many different networks without remembering and reconfiguring complex settings for each one.

SECURING INFORMATION

When traveling, business users risk having their portable PCs stolen. If a Windows 2000 Professional-based PC is stolen, all files, including confidential company and client information, are inaccessible to a thief.

Today, many companies use the Internet as a secure, cost-effective extension to their corporate networks. Windows 2000 Professional helps people take advantage of the Internet easily and securely.

Protecting Data

With the addition of Encrypted File System (EFS), Windows 2000 Professional offers more heightened security than Windows 95 and Windows NT Workstation 4.0. If users store sensitive information on a mobile computer, they can encrypt those files and folders. If the laptop is stolen, EFS protects its files and folders, even if the thief reinstalls Windows 2000 Professional. Only users with a special decryption key can access the file.[7]

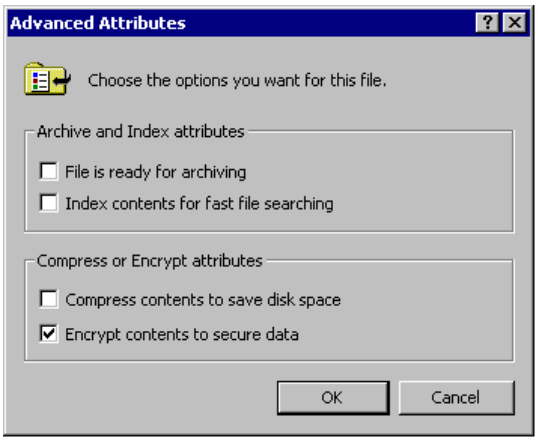

Figure 15. Windows 2000 Professional users can encrypt data to protect it.

Windows 2000 Server provides additional EFS security when used in combination with Windows 2000 Professional. If a user leaves a company, no one can gain access to encrypted files—even an administrator on the local system. With Windows 2000 Server, administrators can set policy to recover encrypted data if passwords are lost.

[7] EFS provides only local encryption. If a file is sent over a network, for example, encryption must be handled differently, such as through IPsec or other network security technologies.

User Profiles

Many businesses share laptops among employees. Windows 2000 Professional supports using multiple user profiles on the same machine, which protects one user's data from being viewed by another. Administrators can configure laptops with Windows 2000 Professional so that users have their own protected set of data, applications, and preferences. Many hardware specific components, such as modems or networking cards, can be configured to work across each of the user profiles. Only users with administrative rights can view all of the files.

Giving File Access Permissions

Windows 2000 Professional users can set access permissions to files, either over the network or locally. These permissions can be set for individual users or groups of users. For example, a user can set a folder for “read-only” or “full control” access. This is useful for businesses that share laptops and also can be applied to removable media, such as PC card hard drives that can be formatted using NTFS 5 file system.

Protecting Laptops with Smart Cards

Windows 2000 Professional gives organizations the option to equip users with Smart Cards, which enable a multi-factor security system and make mobile computers even safer from attack.[8] PC card Smart Card readers are available from a variety of manufacturers.

[8] Windows 2000 Server includes a robust infrastructure supporting Smart Card services. Smart Card support in other network environments varies. Administrators should check with the manufacturer.

FOR MORE INFORMATION

For the latest information on Windows 2000 Professional, check out our World Wide Web site at http://www.microsoft.com/ntworkstation, the Windows NT Workstation Forum on MSN™, and The Microsoft Network online service (GO WORD: MSNTS).